CLAIMS

1. A self-aligning roller bearing in which double row rollers as rolling elements are arranged rollably between an inner ring and an outer ring in a circumferential direction,

wherein a roughness of an outer ring raceway surface formed on an inner peripheral surface of the outer ring is made larger than a roughness of an inner ring raceway surface formed on an outer peripheral surface of the inner ring, and

an average roughness Ra of the outer ring raceway surface is set within $0.1\ \mu m \leqq Ra \leqq 0.5\ \mu m$ in an axial direction and a circumferential direction, and a roughness parameter S that is defined by

$$S = \frac{1}{n}\sum_{i=1}^{n} S_i$$

where n is a number of peaks of the roughness of a roughness curve indicating the roughness of the outer ring raceway surface, and

Si is an interval between neighboring peaks of the roughness curve

is set within $0<S\leqq 20\ \mu m$.

2. A self-aligning roller bearing in which double row rollers as rolling elements are arranged rollably between an inner ring and an outer ring in a circumferential direction,

wherein a roughness of an outer ring raceway surface formed on an inner peripheral surface of the outer ring is made larger than a roughness of an inner ring raceway surface formed on an outer peripheral surface of the inner ring, and

an average roughness Ra of the outer ring raceway surface is

set within 0.1 $\mu m \leqq Ra \leqq 0.5$ μm in an axial direction and a circumferential direction, an average roughness of a rolling contact surface of the rolling element is set to Ra<0.1 μm, and an average roughness of the inner ring raceway surface is set to Ra<0.15 μm.

3. A self-aligning roller bearing in which double row rollers as rolling elements are arranged rollably between an inner ring and an outer ring in a circumferential direction,

wherein a roughness of an outer ring raceway surface formed on an inner peripheral surface of the outer ring is made larger than a roughness of an inner ring raceway surface formed on an outer peripheral surface of the inner ring, and

an inequality Rao/Rai≧1.5 is satisfied where Rai is an upper limit value of a roughness range on the inner ring raceway surface on a center line and Rao is a lower limit value of a roughness range on the inner ring raceway surface on a center line, and a difference of a retained austenite content γR between the rolling elements and at least any one of the inner ring and the outer ring is set to 3 % or more in volume ratio.

4. A self-aligning roller bearing according to claim 1, wherein an average roughness of a rolling contact surface of the rolling element is set to Ra<0.1 μm, and an average roughness of the inner ring raceway surface is set to Ra<0.15 μm.

5. A self-aligning roller bearing according to claim 1, wherein an inequality Rao/Rai≧1.5 is satisfied where Rai is an upper limit value of a roughness range on the inner ring raceway surface on a center line and Rao is a lower limit value of a roughness range on the inner ring raceway surface on a center line, and a difference

of a retained austenite content γR between the rolling elements and at least any one of the inner ring and the outer ring is set to 3 % or more in volume ratio.

6. A self-aligning roller bearing according to claim 2, wherein an inequality $Rao/Rai \geqq 1.5$ is satisfied where Rai is an upper limit value of a roughness range on the inner ring raceway surface on a center line and Rao is a lower limit value of a roughness range on the inner ring raceway surface on a center line, and a difference of a retained austenite content γR between the rolling elements and at least any one of the inner ring and the outer ring is set to 3 % or more in volume ratio.

7. A self-aligning roller bearing according to claim 4, wherein an inequality $Rao/Rai \geqq 1.5$ is satisfied where Rai is an upper limit value of a roughness range on the inner ring raceway surface on a center line and Rao is a lower limit value of a roughness range on the inner ring raceway surface on a center line, and a difference of a retained austenite content γR between the rolling elements and at least any one of the inner ring and the outer ring is set to 3 % or more in volume ratio.

8. A self-aligning roller bearing according to claim 1, wherein the average roughness Ra of the outer ring raceway surface is set within $0.1\ \mu m \leqq Ra \leqq 0.5\ \mu m$ in the axial direction and the circumferential direction in ranges of $b_1/(B/2) \leqq 0.9$, $b_2(B/2) \leqq 0.9$ and in a measured length of 0.1 mm to 1.0 mm where B is a width of the outer ring and b_1, b_2 are a distance from both end surfaces of the outer ring respectively, and the roughness parameter S is set within $0 < S \leqq 20\ \mu m$.

9. A self-aligning roller bearing according to claim 1,

wherein the outer ring raceway surface has machining traces that intersect with each other and the machining traces are formed by a super finishing.

10. A self-aligning roller bearing according to claim 2, wherein the outer ring raceway surface has machining traces that intersect with each other and the machining traces are formed by a super finishing.

11. A self-aligning roller bearing according to claim 3, wherein the outer ring raceway surface has machining traces that intersect with each other and the machining traces are formed by a super finishing.